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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,991	12/09/2003	Peter G. Borden	00849402USA	5839

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EXAMINER	
AKANBI, ISIAKA O	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/731,991	BORDEN ET AL.	
	Examiner	Art Unit	
	Isiaka O. Akanbi	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *21-26* is/are allowed.

6)☒ Claim(s) *1,4,5,9-11,13-15,17-20,27-31 and 33-35* is/are rejected.

7)☐ Claim(s) *2,3,6-8,12,16 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 July 2004* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *04 March 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement file 09 December 2003, 21 June 2005 and 04 March 2006 has been entered and reference considered by the examiner.

Drawings

The examiner approves the drawings filed 02 July 2004.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as recites the limitation " a second mirror mounted along the second line, opposite to the means for moving " in line 2-3 claim 33. There is insufficient antecedent basis for this limitation in the claim 27. It appears or look like it intended to depend on claim 32 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as recites the limitation "another laser mounted along the second line, opposite to the mirror " in line 2 claim 35. There is insufficient antecedent basis for this limitation in the claim 27. It appears or look like it intended to depend on claim 32 which is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-5, 9-11, 13-15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakazawa et al. (4112309).

As regard to claims 1 and 20, Nakazawa discloses a method of detecting a signal indicative of a property of a structure in a semiconductor wafer comprising of the following:

receiving (8) a semiconductor wafer (5) that comprises a test structure, wherein the test structure comprises a first and second region (7a/7b/7c) that differ from each other by at least one property and wherein the first region comprises an interface in the wafer (5), oscillating a spot of coherent electromagnetic radiation between the first region and the second region; wherein a penetration depth of the coherent electromagnetic radiation is between a depth of the interface and a thickness of the wafer (col. 2, line 50-66) and using a photodetector (22) to measure intensity of a portion of the electromagnetic radiation reflected during said oscillating; and synchronously detecting, at a frequency of said oscillating, an amplitude of an electrical signal generated by the photodetector during measurement by the photodetector (col. 1, line 28-57).

As to claims 4 and 5, Nakazawa discloses changing at least one process parameter used in fabricating the wafer if said amplitude falls outside a predetermined range and wherein the interface is positioned between a first layer that forms a portion of the front surface and a second layer of semiconductor material located underneath the first layer, wherein the first layer is formed of a dielectric material or of a conductive material (i.e. semiconductor)(figs. 1, 5 and 7)(col. 4, line 46-col. 6, line 1-40).

As to claim 9, Nakazawa discloses wherein said synchronously detecting is performed in a lock-in amplifier coupled to said photodetector to receive therefrom said electrical signal, said lock-in amplifier being tuned to the predetermined frequency f, and said lock-in amplifier detecting said amplitude of fluctuation of said electrical signal (figs. 5-7)(col. 8, line 3-61).

As to claims 10 and 11, Nakazawa discloses where at least one of said beam (15) and said wafer is kept stationary relative to ground and where a source of said beam and the wafer are 5 both kept stationary relative to ground, and using a beam deflector to move the beam relative to the wafer (col. 6, line 58-col. 7, line 1-25).

As to claims 13 and 14, Nakazawa discloses wherein said first region and said second region touch each other at a common boundary and wherein said first region and said second region are separated from each other (figs. 1 and 3).

As to claim 15, Nakazawa discloses coherent electromagnetic radiation (14) is substantially of a predetermined wavelength (col. 3, line 16-23).

As to claims 17 19 and 20, Nakazawa discloses wherein said spot is formed continuously on said wafer, wherein said wafer comprises at least a portion of an integrated circuit, said integrated circuit being in addition to said test structure also comprised in said wafer and forming said portion of integrated circuit and said test structure using at least One common process Step (fig. 3)(col. 1, line 14-27 and line 63-66)(col. 3, line 37-46).

As to claim 18, Nakazawa discloses wherein said spot is oscillated along a straight line (fig. 3)(col. 2, line 50-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 27-31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (4112309).

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa. The reference of Nakazawa teaches of the features of claim 27, comprising a patterning tool, a measurement tool, a source (14) of a beam of coherent electromagnetic radiation of absorption length less than a thickness of the wafer but greater than a depth of an interface in the wafer, means for moving at least one of the beam and a stage (8) carrying the wafer relative to one

another to oscillate a spot formed by the beam between a first region and a second region of the wafer and a photodetector located in a path of reflection of the beam from the wafer (col. 1, line 28-57)(col. 2, line 46-66). However the reference of Nakazawa is silent regarding an ion implanter located adjacent to the patterning tool. To employ an apparatus for an ion implanter located adjacent to the patterning tool would have been obvious to one having ordinary skill in the art at the time of invention to processes such as etching and forming ion implanted for the purpose of achieving increased microminiaturization of certain types of integrated circuits and for alignment process accuracy.

As to claims 28, Nakazawa discloses everything claimed, as applied to claim 27 above, in addition Nakazawa discloses wherein the source of said coherent beam of electromagnetic radiation is a laser (14)(col. 3, line 18-23).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (4112309) as applied to claim 27, in view of the examiner Official Notice.

As to claims 29 and 30, the reference of Nakazawa discloses everything claimed, as applied to claim 27 above, in addition Nakazawa discloses deflector (30) located in a path of the beam (fig. 8) and a scanning mirror (52) located in a path of the beam. The reference of Nakazawa is silent with regard to the type of deflector and mirror as being (i.e. acousto-optic or galvanometer mirror). The examiner wishes to take Official Notice of the fact that the use of an acousto-optic type deflector and galvanometer type mirror for scanning located in a path of the beam would have been well known. It would have been obvious to one having ordinary skill in the art at the time of invention to use an acousto-optic type deflector and galvanometer type mirror for the purpose of scanning accuracy.

As to claims 31, Nakazawa discloses everything claimed, as applied to claim 27 above, in addition Nakazawa discloses movable stage (8)(col. 3, line 34).

As to claims 34, Nakazawa discloses everything claimed, as applied to claim 27 above, in addition Nakazawa discloses a synchronous detector (36/39) coupled to the photodetector to receive a first electrical signal generated by the photodetector, the synchronous detector being further coupled to said means by a cable carrying a predetermined frequency of oscillation of said spot by said means, the synchronous detector measuring an amplitude of a portion of the

first electrical signal fluctuating at the predetermined frequency and in phase with movement by said means (fig. 9).

Allowable Subject Matter

Claims 21-26 are allowable

As to claim 21, the prior art of record, taken alone or in combination, fails to disclose or render obvious oscillating a first spot and a second spot that at least partially overlaps the first spot between the first region and the second region; wherein the first spot is formed by a first beam of coherent electromagnetic radiation that has a first penetration depth between a depth of the interface and a thickness of the wafer, wherein the second spot is formed by a second beam of coherent electromagnetic radiation, wherein the first beam has photon energy lower than a semiconductor bandgap energy and the second beam has photon energy greater than the semiconductor bandgap energy. Claims 22-26 are allowable by virtue of their dependency on claim 21.

Claims 2, 3, 6-8, 12, 16 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim 2, the prior art of record, taken alone or in combination, fails to disclose or render obvious repeating said acts of (oscillating, using photodetector and synchronously detecting) with electromagnetic radiation of another wavelength.

As to claim 3, the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the first region comprises a plurality of dopants, and said property is selected from a group consisting of: depth of an interface between the first region and a well in which the first region is formed, abruptness of a profile of the dopants, and a peak in the dopant profile.

As to claim 6, the prior art of record, taken alone or in combination, fails to disclose or render obvious performing a look-up of a table of predetermined data with said amplitude as input to determine thickness of the first layer.

As to claim 7, the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein only one of the first region and second region is a doped region and the method further comprises performing a look-up of a table of predetermined data with said amplitude as input to determine a property of the doped region. Claim 1 is allowable by virtue of its dependency on claim 7.

As to claim 12, the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the absorption length of the beam in the wafer is less than one-half of the thickness of the wafer.

As to claim 16, the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein said spot is formed on a first surface at which a doped region is located in said wafer.

As to claim 32, the prior art of record, taken alone or in combination, fails to disclose or render obvious a plurality of additional lasers mounted adjacent to one another at a plurality of positions located along a first line, and said source is mounted adjacent to one of the additional lasers and along the first line, at least one mirror attached to means for translation along a second line parallel to the first line, and between a plurality of corresponding locations opposite to the plurality of positions of the lasers and said source, a stage for supporting the wafer, with a front surface of the wafer facing the beam from the mirror at normal incidence thereof, wherein the means for moving comprises an optical element located along the second line, in a path of the beam reflected by the mirror and the apparatus further comprises a beam splitter located along the second line, between the means for moving and the mirror.

Additional Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references listed in the attached form PTO-892 teach of other prior art method of detecting a signal indicative of a property of a structure in a semiconductor wafer that may anticipate or obviate the claims of the applicant's invention.

Conclusion

Official Notice

Several facts have been relied upon from the personal knowledge of the examiner about which the examiner took Official Notice. Applicant must seasonably challenge well known statements and statements based on personal knowledge. In re Selmi, 156 F.2d 96, 70 USPQ 197 (CCPA 1946); In re Fischer, 125 F.2d 725, 52 USPQ 473 (CCPA 1942). See also In re Boon, 439 F.2d 724, 169 USPQ 231 (CCPA 1971) (a challenge to the taking of judicial notice must contain adequate information or argument to create on its face a reasonable doubt regarding the circumstances justifying the judicial notice). If applicant does not seasonably traverse the well-known statement during examination, then the object of the well-known statement is taken to be admitted prior art. In re Chevenard, 139 F.2d 71, 60 USPQ 239 (CCPA 1943). A seasonable challenge constitutes a demand for evidence made as soon as practicable during prosecution. Thus, applicant is charged with rebutting the well-known statement in the next reply after the Office action in which the well-known statement was made. See MPEP 2144.03, paragraphs 4 and 6.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isiaka Akanbi whose telephone number is (571) 272-8658. The examiner can normally be reached on 8:00 a.m. - 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Isiaka Akanbi
May 9, 2006

Gregory J. Toatley, Jr.
Supervisory Patent Examiner